

Orchard and Garden Mites.

No. 1. BLISTER MITES (Family *Eriophyiidae*.)

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THERE are several groups of destructive little creatures known as mites. Though not true insects, they are often serious pests in the garden and orchard, where, on account of their rapid reproduction under favourable climatic conditions and their small size, they may do a great deal of damage before they are discovered.

Mites belong to the *Acarina*, a well-defined group of the *Arachnida*, which also includes spiders, scorpions, and ticks. They are distinguished from true insects by the number and structure of their legs; while insects always have three pairs, mites may have either three pairs or two. The head and thorax of an insect are distinctly separated, and with the abdomen, form three divisions, but the head and thorax of a mite are solidified together, and the whole is known as the cephalothorax.

Many species are cosmopolitan, and they have been spread far and wide in the leaf buds of their plant hosts or in the egg stage on the bark. They are divided into a number of well-defined families; of these, the blister mites and the spinning mites are well known to the gardener and orchardist.

The Leaf Blister Mite (Family *Eriophyiidae*.)

The members of this family are all so minute that they require to be studied with a high-power microscope to obtain any details of their structure. They bury themselves in the skin of the fruit, and either discolour and crack the surface, produce a thickening of the tissue of the leaves, or form blister galls or erineum, composed of masses of deformed hairs on the surface of the leaves and known as *acaro-cecidi*. Banks has figured and described these structures under the names dimple galls, pouch galls, capsule galls, nail galls, rib galls, and blister galls, according to their form. Several of our eucalypts have their foliage thickly encrusted with patches of crimson capsule galls, probably due to the presence of similar mites. In most of the earlier works upon blister mites, they were placed in the genus *Phytoptus*, formed by Dujardin in 1851; but it has recently been discovered that Siebold, working on the same group only a year before, had created the genus *Eriophyes* for their reception; so, by the recognised law of priority, this name now displaces that of *Phytoptus*.

From their curious, elongate fusiform shape and the fact that they only had two pairs of legs, the entomologists who first discovered the makers of the galls came to the conclusion that they were not adult, but some active, eight-legged mite in the immature stage. It is quite a common thing to find specimens of eight-legged mites sheltering on the under-surface of foliage infested with blister mite, so it was not an unnatural mistake.

The Pear-leaf Blister Mite. (*Eriophyes pyri*, Pagenstecher).

This is a well known cosmopolitan pest upon the foliage of the pear tree. Hibernating in the bracts of the leaf buds, it attacks the tiny unfolding leaves, causing them to develop variegated reddish-green blisters, which, as the leaves mature, become brownish-black patches of thickened tissue spread all over the leaf. In these the full-grown mites shelter; they emerge through a minute opening on the under-surface of the infested leaf. The adult mites are white, of the typical cylindrical form, with the two pairs of short legs on the hind margin of the head. They are just noticeable to the naked eye when moving out of the gall, and measure about $\frac{1}{25}$ of an inch.

This mite was described from Germany in 1857, and it is common in England. Miss Ormerod, in her account of this orchard pest ("Handbook of Orchard and Bush Fruit Insects," p. 127), reproduces Nepaula's figure of it, and states that she could always get specimens for study in her orchard. It was probably introduced into the United States from Europe at a very early date, as it was identified and described from that country in 1872. Dr. James Fletcher states that it does a considerable amount of damage in Canada. We have no early record of its introduction into Australia. Fraser Crawford noted it in South Australia in 1881; French, in the first part of his "Handbook of the Destructive Insects of Victoria," records it from that State in 1891; and Dr. Cobb noticed it in this journal in the same year, giving in the year following a woodcut and general account of it, and pointing out that it might often be mistaken for pear-leaf scab (*Fusicladium pyrinum*). As the treatment of these two leaf pests is very different, their identification is important. Dr. Cobb showed that they could be distinguished from each other when examined through a low-power lens, the mite galls being furnished with a small opening which the fungus galls lack.

Experiments, carried out at Cornell University by Professor Slingerland, show that the pear-leaf blister mite can be easily controlled by spraying with kerosene emulsion, diluted with from five to seven parts of water, any time after the leaves have fallen. At this time all the mites will have left the dead and dying leaves, and will be wintering in the bracts of the leaf buds before attacking the opening leaves in the coming spring. If the spraying is carefully carried out, and every bud drenched, all the mites will be killed by the oil. This mite is not uncommon at times in our pear orchards, particularly in the southern districts, but is seldom plentiful enough to defoliate the trees as it is said to do in other countries.

The Vine-leaf Blister Mite (*Eriophyes vitis*, Landois).

A native of Europe, this mite was accidentally introduced into the United States, and according to Essig is now found in all the vine-growing districts of California. It probably came across the Pacific to this country, and is certainly a recent introduction—probably of the last ten years. During the last two, however, it has spread all through the vineyards of the county of Cumberland; many specimens of blistered leaves were forwarded to the Department during the last summer.

The blisters on the infested leaves are due to the presence of numbers of tiny microscopic elongate cylindrical mites, which, wintering in the bark or bracts of the leaf buds, crawl out on the expanding leaves and puncture them as the leaf reaches maturity. The colonies of mites congregated in the blisters cause the aborted tissue to turn yellow or brown. These mites are white, and very similar in general form to those that blister pear leaves. They have only two pairs of legs, and these are situated close behind the head. The mites are so small that only with the aid of a good lens can one observe their movements. In the earlier stages of the gall development they are very difficult to make out; but, as the leaves and galls mature in March and April, the mites emerge from the mass of deformed hairs filling the blister, and can be easily noted under the microscope.

Essig says: "Sulphuring the vines early in the spring, soon after the buds open, as is ordinarily applied for mildew, is usually sufficient to hold the mite in complete subjection." Spraying with kerosene emulsion as recommended by Slingerland and the burning of all vine cuttings from infested vines would also be effective.

The Silver or Orange Rust Mite. (*Phyllocoptes oleivorus*, Ashmead).

This mite is a native of Florida, where it lived originally upon the wild citrus trees of the forests; it was described by Ashmead and included in Hubbard's "Insects affecting the Orange." It was accidentally introduced into California with nursery stock, and though it has not spread much from the original area in which it was first discovered, it is found, according to Higgins, in the Hawaiian Islands. The writer saw oranges and grape-fruit deeply discoloured by its presence in the citrus orchards of Cuba and Jamaica.

This mite takes the first of its popular names from the curious silvery sheen on the skin of the infested lemons before they ripen; this, later on, gives place to a network of cracks all over the rind as it hardens. When the rind of the orange is attacked it assumes a russet tint; this discolouration of the skin (due to the presence of the tiny mites embedded in the surface) is identical with that known in Australia as "Maori disease" of oranges.

Olliff discovered the mite upon oranges from an orchard at Emu Plains in 1891. He identified it with the orange pest described by Hubbard, and noted in the pages of this journal its presence in Australia. Under the heading of "Orange Rust Mite or 'Maori'" he reported in the following season (*Gazette*, vol. ii, page 671), the successful application of sulphur and soap wash at the infested orchard. This is one of the smallest mites, and is very difficult to separate from the tissue of the skin of the fruit. Though Olliff's identification is doubtless correct, the writer finds it difficult to believe he found the mites in the discoloured orange skin. Hubbard, however, states that he collected them in large numbers when they were away from the fruits resting on the leaves.

Though infestation by this mite is still often noticed in our orchards, it does not seem to be a very serious citrus pest in Australia.

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TO PROTECT SEED MAIZE FROM RABBITS.

“Do your officers know of any treatment for maize seed that would make it distasteful to rabbits, bunny having learned to take the corn in the same manner as kangaroo rats do?” The question occurred in a letter from a Glen Innes correspondent, to whom the reply was:—

The process used on the North Coast to protect maize planted adjacent to scrubs from such animals as kangaroo rats, bandicoots, &c., is to smear the seed with coal tar. This is best done by immersing the seed first of all in fairly warm water, and then draining off the water and quickly adding the tar at the rate of about a small cupful to a bushel of corn. The seed should be thoroughly mixed with the tar so as to ensure every grain being coated. Slaked lime or dust can be used for quick drying and the seed is then quite ready for sowing in a drill.

Poison baits of phosphorised pollard laid on the ground about a week before sowing (“dummying” or baiting without poison for a while beforehand until a good “catch” is assured) will also help considerably.

If the rabbit follows the furrows along like the kangaroo rat, it is a wise precaution to obliterate the planter rows by cross-harrowing.